Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Pearson Creek

Water Body Segment at a Glance:


State map showing location of watershed

County: Greene
Nearby Cities: Springfield
Length of Classified Segment 8.0 miles
Length of impairment: 2.0 miles
Pollutants: Unknown
Source: Unknown
Water Body ID: 2373

See also Bacteria Information Sheet

TMDL Development Date: Established by EPA 2011

Description of the Problem

Designated Beneficial uses of Pearson Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Whole Body Contact Recreation

Uses that are impaired

- Protection of Warm Water Aquatic Life

Standards that Apply

- In Missouri's Water Quality Standards, or WQS, 10 CSR 20-7.030 (3)(D) and (G), the general criteria state that:
  - Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.
  - Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.

Background information and water quality data

Pearson Creek (also spelled Pierson) drains a 23.4 square mile watershed. The northern and eastern portions of the watershed are primarily agricultural lands. Agricultural activities include dairy farming and pasturing beef cattle. The western and southern portions of the watershed consist primarily of urban development, located on the eastern edge of Springfield, Mo. Pearson Creek

joins the James River just above the municipal drinking water intake. Output from springs provides a significant amount of flow to the creek.

Pearson Creek is on the Missouri 2008 303(d) List of impaired waters for unknown toxicity. The part of Pearson Creek that is impaired starts where Jones Spring Branch enters. This branch drains the east side of Springfield and, based on numerous studies nationwide, it is determined the impairment comes from the impact of storm water runoff from the city through that branch. The primary evidence of impairment in Pearson Creek comes from long term monitoring by biologists with the city's drinking water provider, City Utilities of Springfield. Their data show a significant reduction in the number of aquatic invertebrate species (like crayfish and water insects) between the 1960s and the 1990s. To try and identify the unknown toxicity and its source(s), the U.S. Geological Survey completed a water quality study of the Springfield urban area in 2000 (report published in 2003). This study focused on heavy metal and organic toxicants in normal and storm water flows in Pearson Creek. It revealed the presence of many potentially toxic chemicals. However, none of these chemicals were found in concentrations large enough to exceed state standards for protecting aquatic life. Meanwhile, the Municipal Separate Sanitary Storm System Permit, or MS4, for the City of Springfield was issued July 2002. Monitoring the storm water since then (a requirement of the permit) has not revealed exceedances of the WQS or notable toxicity. In addition, the U.S. Environmental Protection Agency conducted monitoring in 2009 in preparation for developing the TMDL. This monitoring identified several compounds with known toxicity to aquatic life. Sources of these contaminants are associated with urban areas and will be mitigated if storm water is controlled.

Therefore, the TMDL for Pearson Creek targets the reduction of storm water runoff as a surrogate for pollutants causing the aquatic life beneficial use impairment. This is supported by scientific literature and site specific studies.

Table 1 shows how biological diversity and numbers decrease from the upper (above Jones Spring Branch) to the lower parts of the stream.

Table 1. Average Aquatic Biological Diversity in Pearson Creek, 1984-1992

	Number of EPT taxa[1]	**Biotic Index[2]**	**Number of taxa per 100 organisms**
Upper Pearson Creek	29	26	17
Lower Pearson Creek	14	28	14

[1] Orders Ephemeroptera (Mayflies), Plecoptera (Stoneflies), and Trichoptera (Caddisflies), which are pollution intolerant.
[2] Based on numbers of taxa and number of individuals within each taxon per sample
Source: City Utilities of Springfield

Tables 2 and 3 show how biological diversity and numbers have decreased with time.

Table 2. Historical Changes in Aquatic Macroinvertebrates in Lower Pearson Creek

	1964-1965	1992
Biotic Index[1]	28.7	27.7
Number of taxa per 100 organisms	17.5	14.5
Total number of taxa	24.5	17.8
Number of EPT taxa[2]	12.8	5.8

[1] Based on numbers of taxa and number of individuals within each taxon per sample
[2] Orders Ephemeroptera (Mayflies), Plecoptera (Stoneflies), and Trichoptera (Caddisflies)
Source: City Utilities of Springfield

Table 3. Total Number of Taxa in Pearson Creek at Cherry Street

Year	Total Taxa
1992	24
1999	20
2001	17

Source: City Utilities of Springfield

Table 4 has the Stream Condition Index scores from 2004-05. A score of less than 16 indicates the stream is not fully supporting the aquatic life use and is considered impaired. Invertebrate communities are judged to be impaired if the percent of sampling sites receiving a score of 16 or more is significantly less than for reference streams in the same ecological drainage unit (EDU). Reference streams in this EDU score 16 or higher on 94.4 % of samples. Pearson Creek was zero percent of four samples.

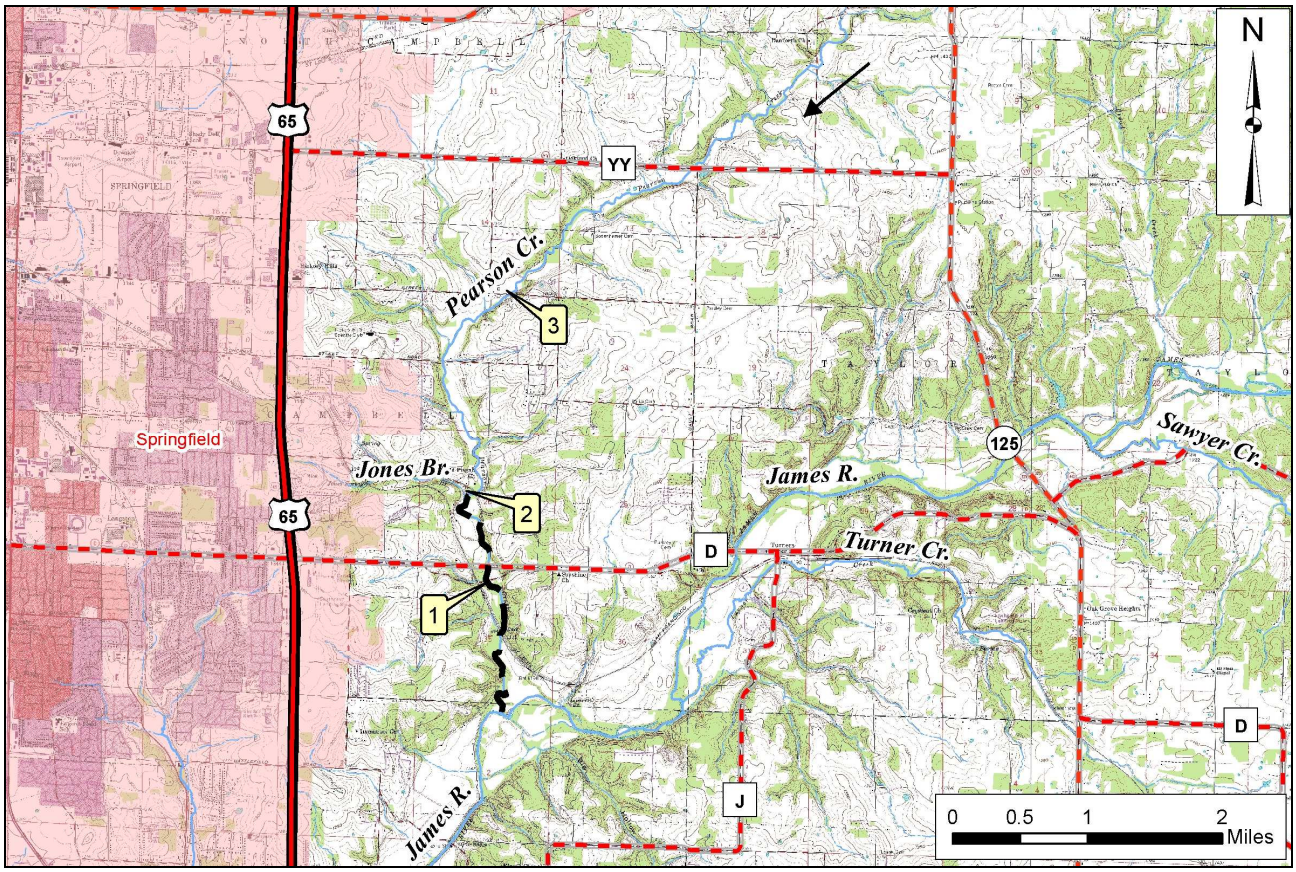
Table 4. Aquatic Invertebrate Monitoring by Missouri DNR 2004-2005

Org	Site	Location	Date	Score
MDNR	2372/2.0	Pearson Cr. @ Jones Br.	Fall 2004	10
MDNR	2373/2.0	Pearson Cr. @ Jones Br.	Spring 2005	10
MDNR	2373/1.2	Pearson Cr. nr. Mouth	Fall 2004	10
MDNR	2373/1.2	Pearson Cr. nr. Mouth	Spring 2005	10

The Pearson Creek TMDL was established by the U.S. Environmental Protection Agency, or EPA, January 28, 2011.

A map of Pearson Creek may be found on the next page.

Pearson Creek in Greene County, Mo., with sampling sites



Impaired Segment → Direction of Flow

Sample Sites
1 – Pearson Creek near mouth
2 – Pearson Creek at Jones Branch
3 – Pearson Creek at Cherry Street

For more information call or write:
Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or 573-751-1300 office
573-522-9920 fax
Program Home Page: dnr.mo.gov/env/wpp/index.html